SESSION I
TIME: Tuesday 13 April, 8:30-10:00
ROOM: Maryland - D
TRACK: Inland and Deep Draft Navigation
TOPIC: Deep Draft Tool Applications
MODERATOR: Kim Otto, Mobile District

PRESENTATIONS:

Title: Research into Relationships Applicable to Estimation of Vessel Loading and Transit Draft Estimation for Navigation Studies
Presenter: Dr. Jennifer Waters, U.S. Naval Academy

Abstract: The Naval Academy has been working with the Institute for Water Resources for several years to research the nuances of vessel loading techniques used by the industry in order to develop a better understanding and a better set of tools for estimating vessel transit drafts.

Title: Tidal Delay Model
Presenter: Karl Sudar, IWR

Abstract: The Institute for Water Resources has been funding the development of a desktop computer model that will assist the field in analyzing and evaluating navigation projects. As part of this multi-year effort, Karl Sudar is presenting the results of the most recent tool development effort, which is computer model that will estimate the impacts of tidal delay s on vessel traffic in a project area.

Title: Deep-draft Harbor Vessel Simulation Model Case Study: Port Everglades, Located in Fort Lauderdale, FL
Presenter: Becky Moyer, Jacksonville District

Abstract: In evaluating the federal interest in proposed improvements to alleviate traffic restrictions and accommodate next-generation container and cruise vessels at Port Everglades, traditional core competencies in inland navigation were adapted for analyzing deep-draft harbor navigation. Efficiency gains, which form the basis of economic justification from a national perspective, were measured by adapting models that have been effective in analyzing inland navigation systems for more than 20 years. The Waterways Analysis Model (WAM) has been used to simulate the operation of locks in the inland navigation systems. WAM, a stochastic simulation model written in Simscript II.5, is maintained by the LRD Navigation Planning Center. Adapting WAM to simulate harbor operations in Port Everglades was the second such application of this deep-draft harbor model (originally developed for Charleston Harbor, SC), and a good example of integrating technology across traditional functional and geographic boundaries.

The economic justification of any navigation improvement is generally based on improving the system's overall efficiency. Simulation models are powerful tools for measuring such gains. A model calibrated to reflect the operation of an existing navigation system and traffic levels can be easily modified to simulate the effects of a wide array of physical and operational changes. The incremental analysis of project features is made not only possible, but also easy.
More important, simulation models can capture the effects of randomness on system performance. The normal operations of Port Everglades are punctuated by random periods of extremely high use.

Obviously, vessel interference and other delays would be greatly reduced if vessels arrived at a uniform rate. Models that fail to capture the effect of randomness overstate the efficiency of the system and thus understate the benefits of improving that system.

The visual displays of the model's animation features compliment the computations of the numerical model. Customers and other interested stakeholders can observe the competition of vessels for the harbor's channels, berths, and turning basins. It's a vivid impression of the Corps' ability to deploy cutting edge technology and inspires confidence in the model's reliability. These displays of real-world conditions enable analysts to "see" how the numerical model is working and refine its operation. They also make great briefing tools for decision-makers.

Title: **HarborSym Model – Tampa Harbor System**
Presenter: **Shana Heisey-Olig, IWR**

Abstract: HarborSym is a deep draft simulation model under development at the Institute for Water Resources. The intent of this model is to assist in economic analyses for channel widening projects. IWR develops models to satisfy three basic criteria: transparency, portability, and ease of use. These principles encourage development of generic, data driven models; the ultimate goal being models field personnel can use without extensive knowledge of programming languages and without outside assistance. First developed with the Galveston District in 2001, HarborSym is currently undergoing revisions for use on the Tampa Harbor GRR with the Jacksonville District. The presentation will discuss these revisions and the need for them in analyzing the Tampa Harbor system. Recent improvements to the model include an enhanced user interface to facilitate data entry. In this new interface the link-node network representing the project harbor can be displayed on top of a location map, making it easier for stakeholders and analysts to understand the system. Additional improvements include a vessel generator to help with generation and allocation of future shipment lists. Tidal influences have also been incorporated for the Tampa study, allowing for tide-dependent draft rules and current restrictions. Features such as multiple dock, multiple commodity movements, priority vessels, and safety zones have also been added to this version of HarborSym.

SESSION III
TIME: Tuesday 13 April, 3:30-5:00
ROOM: Maryland - D
TRACK: Inland and Deep Draft Navigation
TOPIC: Inland Economic Issues
MODERATOR: Jon Brown, Buffalo District

PRESENTATIONS:

Title: The Economic Foundations of the Ohio River Navigation Investment Model (ORNIM)
Presenter: T. Randall Curlee, Ph.D., Oak Ridge National Laboratory

Abstract. The Ohio River Navigation Investment Model (ORNIM), built by Oak Ridge National Laboratory in collaboration with the Army Corps of Engineers, estimates the benefits of navigation improvements and balances those benefits against the costs of those improvements. This paper identifies the economic assumptions within ORNIM, provides the rational for these assumptions, and addresses how these assumptions alter the estimates of inland-water navigation benefits, as compared to the theoretical model.

ORNIM is a spatially-detailed partial-equilibrium model, which incorporates the following assumptions: (1) demand for individual movements, provided exogenously, is perfectly inelastic; (2) willingness-to-pay for individual river movements is equal to the exogenously given least-cost alternative rail rate; and (3) supply of rail for individual movements is perfectly elastic at the exogenously given rail rate. The first assumption biases upward estimates of with-project benefits. However, empirical evidence on demand elasticity and willingness-to-pay suggests that these assumptions are reasonable in the short-run. In the long-run, decisions to move cargo by water depend only in part on river rates, with environmental and energy policies also being critical. Appropriately, the demand for waterway movements is exogenous to ORNIM; and the Corps' recent scenario-based demand approach is applauded. The third assumption unequivocally biases downward ORNIM's estimate of with-project benefits. Other assumptions also bias benefits downward.

Future ORNIM enhancements include improvements in the analysis of congestion fees, environmental externalities, traffic management, and system reliability. Improvements in data quantity and quality also are needed. ORNIM, like other navigation models, is data constrained. Without significant data improvements, attempts to relax economic assumptions within ORNIM are of questionable value.

Title: Willingness To Pay For Water Transportation In The Ohio River Basin
Presenter: Larry Bray, PhD Tennessee Valley Authority

Abstract. The question of elasticity was raised to a high level in the upper Mississippi River study undertaken by the Rock Island District of the USACE in 1994. This study, in comparison to earlier works, assumed that every shipment is sensitive to price. National Academy of Sciences reviewers supported the idea of using barge demand functions that are responsive to price but were critical of assuming this distribution rather than measuring it empirically. This study summarizes interviews of barge transportation providers and users regarding shipper willingness to pay for barge transportation. Factors that affect demand are discussed in detail. The study also discusses an early attempt to estimate barge price elasticities and the problems inherent in this type of analysis. Significant interview findings are that shippers that located on the Ohio River Basin navigable streams made a major location decision to locate

there and would pay much more than the next least costly rate to maintain barge transportation. It was also found that, if commodities have a high value, are not dangerous to the general public, and move in fairly small quantities, shippers will shift from barge to rail for a small rate savings. The study team had difficulty estimating traditional short-run demand relationships based on cross-sectional data maintained by the Tennessee Valley Authority. It appears that in many settings output decisions and decisions regarding distribution channels are made in advance of transportation considerations, so that output quantities and shipment destinations are parametric in a transportation cost minimization process.

Title: Inland Waterways - Future Utilization and Optimal Investment Strategy
Presenter: Virgil L. Langdon Jr., Huntington District

Abstract. For close to three decades the Corps of Engineers has been measuring incremental system navigation transportation costs for proposed infrastructure investments in search of the National Economic Development (NED) plan; local optimization in a system-level evaluation. Through time the analysis has become increasingly complex and more sophisticated, requiring the development of additional modeling modules. Initially (while still quite complex), the traditional analysis assumed a most-likely traffic forecast, set investment timing and ignored scheduled and unscheduled chamber closures. Cost-Benefit analyses on various alternatives were then compared to determine the without-project condition and the recommended with-project NED plan. Sensitivity analysis of traffic forecasts and investment timing were then done on the with-project plan. The second generation of analysis added the impacts of scheduled chamber closure differences between alternatives. The third generation of analysis added the impacts of unscheduled chamber closures differences between alternatives. It is now desired to optimize system investments simultaneously (not just the investments at one site) under a series of forecast scenarios, while capturing the structural reliability differences (scheduled and unscheduled closures). As the demands of the analysis increase, there was a need to consolidate and dynamically link the various models and techniques developed over the years and to develop new techniques to simultaneously manage all the investment permutations and automatically select optimal investment plans; the desire was to perform system optimization in a system-level evaluation. The objective of this paper is to introduce the innovative analysis techniques of the new Ohio River Navigation Investment Model (ORNIM).

Title: Measuring the Non-Traditional Effects of Inland Navigation
Presenter: Anne Sudar, IWR

The evaluation of navigation projects has evolved from a standard procedure done strictly by engineers and economists to a process involving a wide range of stakeholders. Not surprisingly, these stakeholders have different views regarding what should count in the cost-benefit analysis of water resource projects and how these effects are to be economically valued. Environmentalists argue that traditional benefit-cost analysis does not include the potentially adverse impacts of activities like dredging, thus understating the costs of navigation projects. Industry proponents, on the other hand, believe that some of the benefits of inland waterway transportation, such as lower air emissions, less highway congestion, safety, etc., are not fully captured in traditional benefit-cost analysis. Recently, several Corps of Engineers Districts have ventured into the nontraditional benefits arena. Studies of the Red River, Chickamauga Loc, and the Soo Locks have attempted to measure the air quality, congestion, pavement damage, and accident impacts of shifting freight traffic from inland waterways to trucks and rail, and vice versa. Two earlier studies also measured the energy, emission, and safety effects of improvements to the Upper Mississippi River-Illinois Waterway System, and of drawing down the Snake River, thus halting waterborne transport on the upper portion of it. This paper reviews recent literature on modeling and measuring the externalities of the various freight transportation modes. It also discusses likely futures for two of the externalities: air emissions (declining due to new EPA air quality regulations on diesel fuel and engines); and congestion (increasing everywhere).

SESSION V
TIME: Wednesday 14 April, 3:30-5:00
ROOM: Maryland - D
TRACK: Inland and Deep Draft Navigation
TOPIC: Environmental Considerations in Navigation
MODERATOR: Mark Hammond, Huntington District

PRESENTATIONS:

Title: Submerged Cultural Resources and Water Resources Management
Presenter: Erwin Roemer, Memphis District

Abstract: Submerged cultural resources are a poorly understood category of environmental resources, yet they are pertinent to many activities of Corps' planning and operations/maintenance (O&M). This presentation reviews what these materials are, their importance, and how they fit within the Corps planning process, O&M activities, and our Environmental Operating Principles. Some common perceptions, and misperceptions, are identified along with sources of advice and training.

Title: Environmentally Sensitive Navigation Solutions: Jim Smith Lake
Presenter: Johnny McLean, Little Rock District

Abstract: The Little Rock District Corps of Engineers recently constructed two geotube based structures in and adjacent to Jim Smith Lake in order to protect commercial navigation on the McClellan Kerr Arkansas River Navigation System. Jim Smith is an 85-acre oxbow that lies between the Arkansas and White Rivers near their confluence with the Mississippi River in southeast Arkansas. The landmass between the two rivers at this location is only 1.5 miles wide. In the spring of 2001, overland flows from the White River to the Arkansas River caused significant headcutting and scouring at both ends of the lake. This resulted in the lake being drained and the potential for a new failure path between the rivers. The project delivery team was tasked with developing a design that was functional and practical in this environmentally sensitive area. The design of the structures incorporated bioengineering techniques to enhance stability of the structures and meet the environmental requirements of the project.

Title: Navigation Information Sharing: State and Basin Profiles for Inland Waterway Commerce
Presenter: David Grier, IWR; Dick Ash, Huntington District

Abstract:

Background: In 1999, in response to interest and data requests from the inland navigation industry and trade groups, Huntington District developed a series of Fact Sheets describing the importance of inland waterway navigation to Ohio Basin states. The fact sheets were subsequently expanded to include profiles for key industries, selected construction projects and congressional districts. The profiles were consolidated into the “Inland Navigation Outreach” website hosted by the Huntington District. In 2000, HQ directed IWR to expand the Outreach effort to include other portions of the inland navigation system. IWR worked with Huntington District to expand the website to include state profiles for the Upper and Lower Mississippi River and the Gulf Intracoastal Waterway. The website was renamed “Navigation Information Sharing” and continues to be hosted by the Huntington.

Current Effort and Research Needs: The inland waterway industry is seeking further expansion of the website to include additional states (Pacific Northwest, Atlantic Coast). There is a need for mechanisms to allow the profiles to be easily updated from the Waterborne Commerce Statistics. There is also a need to create basin-wide profiles, develop national industry profiles by commodity group, and to develop a consistent approach to estimate the value of cargo shipped and the transportation savings.

Presentation: The state and industry profiles have become important tools for sharing information about the value of inland navigation with stakeholders, congressional staffs and the general public. The presentation would introduce the Navigation Information Sharing website to session participants and allow them to focus on how the materials could help them characterize the importance of inland navigation to their respective customers and stakeholders. It would also be an opportunity for IWR and Huntington District to obtain feedback on additions and improvements to the website.

Title: Nonstructural Measures and Ohio River Navigation System Optimization

Presenter: William Frechione, Pittsburgh District

Abstract. Transportation system optimization is accomplished through the consideration and implementation of the best mix of structural and nonstructural measures. On inland waterways, structural measures include new lock construction, construction that modifies existing structures (like lock extensions), and small-scale investments like mooring cells, all of which improve lock throughput. Nonstructural measures can both improve system throughput and encourage shippers to alter their behavior in a way that more closely accounts for the social cost of their using the inland waterway. This paper describes the nature of traffic delay problems on the Ohio River, a main artery of the inland waterway system, and discusses an array of nonstructural measures available for optimizing the system. A number of very effective technical, supply-side measures are currently employed at the locks, including lockage sequencing policies, tow-haulage, and helper boats. Traffic demand management measures are also employed, which have successfully altered behavior by providing the waterway user better information about expected periods of congestion. Price-related traffic demand management measures are not currently used, though congestion fee alternatives have been evaluated for projects experiencing episodic, condition-related lock chamber closures and the high delays these events cause. Using congestion fees or lock scheduling appointments to reduce delays that occur during the normal course of using the Ohio River system has not been thoroughly evaluated and is an area that requires a research effort that can be aided through application of the Waterway Analysis Model and Ohio River Navigation Investment Model.

SESSION VI
TIME: Thursday 15 April, 1:30-3:00
ROOM: Maryland - D
TRACK: Inland and Deep Draft Navigation
TOPIC: Other Happenings in Navigation
MODERATOR: David Grier, IWR

PRESENTATIONS:

Title: Improving the Economic Analysis of Small Boat Harbors
Presenter: Brian Harper, Alaska District

Abstract. The Alaska and Honolulu Districts within the Pacific Ocean Division of the U.S. Army Corps of Engineers are routinely involved with small boat harbor improvement projects for which the types of data needed for the evaluations of economic benefits are not readily available or documented. This has forced planners to gather data using collection methods that fit within limited study budgets. The lack of independent verification of the data and information used to support economic analyses has raised questions about the adequacy of the economic estimates. Concerns about data quality and documentation have been raised by internal Corps policy compliance reviews of feasibility study reports as well as by Office of Management and Budget reviewers. These type projects are extremely important to the Alaska and Hawaiian commercial as well as recreation and sport fishing industry. In some of the smaller communities the waterway transport links are crucial to local commerce and social interaction. To assist in trying to develop procedures to improve the economic analysis of these projects a policy study was initiated in fiscal year 2003 and, subsequently, a workshop was held in Anchorage, Alaska on 14-15 August 2003. The workshop presented an opportunity to build a consensus on needed improvements in methods and data used for small boat harbor evaluations and possible ways to address these needs cost-effectively. A report (IWR Report 03-PS-4, available on the IWR homepage) was prepared on the outcome of the meeting. The report discusses the 14 major needs identified at the workshop. A meeting to develop a Plan of Study to implement the report recommendations was held at IWR on 16-17 December 2003.

Title: Shallow Draft Vessel Operating Costs
Presenter: Marianne Matheny-Katz, ASA (CW) (formerly of IWR)

Abstract: Ms. Matheny-Katz will present the results of the latest update of the Shallow Draft Vessel Operating Costs that were collected and analyzed by PMCL for IWR last fiscal year. Marianne will discuss the methods used and the changes that ensued form the new effort.

Title: Deep Draft Vessel Operating Costs
Presenter: Dr. Daniel Jessel, MSI, Inc.

Abstract: Dr. Jessel will be discussing the results of the most recent deep draft vessel operating cost model update. He will address any changes from the previous model and the impacts of those changes on the overall costs for operating deep draft vessels in the world market.

Title: **Engineering Reliability Analysis Modeling for Critical Navigation Infrastructure**

Presenter: **David M. Schaaf, P.E.**

Abstract. The Ohio River is one of the busiest inland waterways in the world. Approximately 280 million tons of cargo is shipped annually on the Ohio River system. The U.S. Army Corps of Engineers (USACE) is conducting multiple studies to determine the long-term investment strategy for sustainable navigation on the inland waterways of the United States. One such study is the Ohio River Mainstem Systems Study (ORMSS). This study utilizes risk based decision making with engineering reliability analyses to determine optimal investment strategies for critical navigation infrastructure such as lock gates, culvert valves, and other primary lock and dam components. This is particularly important for future operations as continued use and deterioration takes its toll on major navigation infrastructure on the Ohio River system.

Major economic consequences occur when lock chambers along the Ohio River are closed to navigation for repair. Closure of a chamber causes significant delay costs to the navigation industry as well as major repair costs to USACE. The ORMSS engineering and economic analysis predicts the impact of future lock chamber closures related to an aging and deteriorated navigation infrastructure system. It does this through innovative analytical engineering reliability analyses of critical operating components coupled with advanced economic modeling techniques. Engineering reliability analyses and event tree modeling are combined with economic models to determine expected delays on an annual basis, per chamber, at each site. Annualized costs for navigation delay and physical repairs are estimated for component failure probabilities, and risk-based decisions are made in order to determine optimal investment strategies and timing to minimize the economic risk. This overall analysis is handled through the Ohio River Investment Model. This paper will detail the engineering features of the model, particularly the engineering inputs required to integrate the engineering and economic analysis.